

CLAIMS

What is claimed is:

- 5.3D, >
- 1 1. A method of distributing image prints printed on a plurality of printers to a
2 plurality of recipients, the method comprising:
3 receiving an order specifying one or more recipients and, for each specified recipient, a
4 set of one or more images associated with that recipient; and
5 for each recipient specified by the order, separating the images associated with the
6 recipient into at least one printable unit of images.
 - 1 2. The method of claim 1 further comprising, for each printable unit, selecting a
2 printer on which to print the printable unit.
 - 1 3. The method of claim 2 further comprising, for each printable unit, printing at least
2 one copy of each image in the printable unit on the selected printer.
 - 1 4. The method of claim 1 wherein each image has associated print parameters.
 - 1 5. The method of claim 4 wherein the images in a printable unit of images have print
2 parameters that allow the printable unit to be continuously printed.
 - 1 6. The method of claim 1 wherein images in a first recipient's image set differ from
2 images in a second recipient's image set.
 - 1 7. The method of claim 4 wherein print parameters of a first recipient's image set
2 differ from print parameters of a second recipient's image set.
 - 1 8. The method of claim 7 wherein print parameters include one or more of print size,

2 number of copies, and/or print finish.

1 9. The method of claim 1 wherein print parameters differ among images within an
2 image set.

1 10. The method of claim 9 wherein print parameters include one or more of print size,
2 number of copies, and/or print finish.

1 11. The method of claim 1 wherein each image set comprises an arbitrary grouping of
2 images designated by a user.

1 12. The method of claim 1 further comprising, for each recipient, separating the
2 images associated with the recipient into one or more sub-orders.

1 13. The method of claim 12 wherein separating the images associated with the
2 recipient into at least one printable unit of images includes, for each sub-order, separating the
3 images associated with the sub-order into one or more sub-batches, each sub-batch representing a
4 printable unit.

1 14. The method of claim 13 wherein the images in a sub-batch have print parameters
2 that allow the sub-batch to be continuously printed.

1 15. The method of claim 13 wherein a plurality of orders is received, the images
2 associated with each recipient specified in each order are divided into at least one sub-order, and
3 each sub-order is divided into at least one sub-batch.

1 16. The method of claim 15 further comprising assembling at least one batch

2 including one or more sub-batches, wherein each sub-batch can be continuously printed on the
3 same type of printer.

1 17. The method of claim 16 wherein the images in a batch have print parameters that
2 allow the batch to be continuously printed.

1 18. The method of claim 16 wherein the at least one batch includes sub-batches from
2 two or more different sub-orders.

1 19. The method of claim 16 further comprising scheduling the batches to be printed in
2 a predetermined ordering.

1 20. The method of claim 19 wherein each order includes image data and control data.

1 21. The method of claim 20 wherein the control data includes at least one of print
2 parameters, user contact information, recipient information, payment information, and message
3 information.

1 22. The method of claim 21 wherein the image data includes pixel data for the images
2 in the order.

1 23. The method of claim 22 wherein the control data is used to control the printing of
2 the images.

1 24. The method of claim 20 further comprising, before printing each image:
2 correcting the image data for that image using information including the control data; and
3 calibrating the image data using information including the control data and at least one

characteristic of the printer on which the image is to be printed.

25. The method of claim 20 further comprising, for each batch, storing the image data for the batch in a cache that is local to the selected printer for that batch.

26. The method of claim 25 further comprising, for each batch, placing the control data for the batch in a queue associated with the selected printer for that batch.

27. The method of claim 26 further comprising, for each batch that is placed in a queue, sending the image data associated with the images included in that batch to an image processor associated with the selected printer for that batch.

28. The method of claim 27 wherein, for each batch that is placed in a queue, sending the image data for that batch to the image processor associated with that queue before the batch reaches the front of the queue.

29. The method of claim 1 further comprising verifying that an image print was printed with the correct image.

30. The method of claim 1 further comprising checking the quality of the image print.

31. The method of claim 13 further comprising:
combining the image prints from at least two sub-batches from the same sub-order; and
distributing the combined image prints to the recipient associated with the at least two sub-orders.

32. The method of claim 1 further comprising printing a destination identifier print

2 that identifies the specified recipient for a corresponding sub-batch of image prints.

1 33. The method of claim 32 wherein the destination identifier print delimits the
2 corresponding sub-batch.

1 34. The method of claim 32 wherein printing the destination identifier print comprises
2 printing one or more of the following items: a shipping address, a recipient's name, a print index,
3 a bar code, a textual message and/or print re-ordering information.

1 35. A method of generating physical manifestations of digital content on a plurality of
2 output devices, the method comprising:

3 receiving an order specifying one or more recipients and, for each specified recipient, a
4 set of digital content associated with that recipient;

5 for each recipient specified by the order, separating the digital content associated with the
6 recipient into at least one generatable unit of digital content; and

7 for each generatable unit of digital content, generating a physical manifestation of the unit
8 of digital content.

1 36. The method of claim 35 further comprising, for each generatable unit of digital
2 content, selecting an output device on which to generate a physical manifestation of the unit of
3 digital content.

1 37. The method of claim 36 wherein each generatable unit of digital content is
2 generated on the output device selected for that generatable unit.

1 38. The method of claim 35 further comprising distributing the physical
2 manifestations to their respective recipients.

1 39. The method of claim 35 wherein a set of digital content comprises one or more
2 digital images.

1 40. The method of claim 39 wherein the physical manifestation of the set of digital
2 content comprises photographic prints of the one or more digital images.

1 41. The method of claim 40 wherein the images in a generatable unit of images have
2 generation parameters that allow the generatable unit to be continuously generated.

1 42. The method of claim 41 wherein the print parameters include one or more of print
2 size, number of copies, and/or print finish.

1 43. A print distribution system comprising:
2 a plurality of printers;
3 a front-end computer sub-system for receiving an order specifying one or more recipients
4 and, for each specified recipient, a set of one or more images associated with that recipient; and
5 a scheduler, connected to the front-end computer sub-system and the plurality of printers,
6 that for each recipient specified by the order (a) separates the images associated with the
7 recipient into at least one printable unit of images, and (b) designates a printer on which each
8 printable unit is to be printed.

1 44. The system of claim 43 wherein each image has associated print parameters.

1 45. The system of claim 44 wherein the images in a printable unit of images have
2 print parameters that allow the printable unit to be continuously printed.

1 46. The system of claim 43 wherein images in a first recipient's image set differ from
2 images in a second recipient's image set.

1 47. The system of claim 43 wherein print parameters of a first recipient's image set
2 differ from print parameters of a second recipient's image set.

1 48. The system of claim 47 wherein print parameters include one or more of print
2 size, number of copies, and/or print finish.

1 49. The system of claim 47 wherein print parameters differ among images within an
2 image set.

1 50. The system of claim 49 wherein print parameters include one or more of print
2 size, number of copies, and/or print finish.

1 51. The system of claim 43 wherein each image set comprises an arbitrary grouping
2 of images designated by a user.

1 52. The system of claim 43 wherein the scheduler:
2 for each recipient, separates the images associated with the recipient into one or more
3 sub-orders; and
4 for each sub-order, separates the images associated with the sub-order into one or more
5 sub-batches, each sub-batch representing a printable unit.

1 53. The system of claim 52 wherein:
2 the front-end computer sub-system receives a plurality of orders; and
3 the scheduler, for each recipient, separates each order into one or more sub-orders and,

4 for each sub-order, separates each sub-order into one or more sub-batches.

1 54. The system of claim 53 wherein the scheduler assembles at least one batch
2 including one or more sub-batches, wherein each sub-batch can be continuously printed on the
3 same type of printer.

1 55. The system of claim 54 wherein the scheduler schedules the batches to be printed
2 in a predetermined ordering.

1 56. The system of claim 55 wherein the scheduler uses a global scheduling algorithm.

1 57. The system of claim 55 wherein the scheduler uses a just-in-time scheduling
2 algorithm.

1 58. The system of claim 55 further comprising a plurality of line controllers, each line
2 controller being associated with a printer and having a queue for storing the batches until they are
3 printed by the printer.

1 59. The system of claim 58 wherein each order includes image data and control data.

1 60. The system of claim 59 wherein the control data includes at least one of print
2 parameters, user contact information, recipient information, payment information, and message
3 information.

1 61. The system of claim 60 wherein the image data includes pixel data for the images
2 in the order.

1 62. The system of claim 61 further comprising an image cache local to the scheduler
2 for caching the image data.

1 63. The system of claim 58 further comprising an image processor associated with at
2 least one of the line controllers for processing the image data and at least a portion of the control
3 data prior to printing the image.

1 64. The system of claim 63 wherein the image processor further comprises image
2 processor software in a computer-readable medium comprising instructions for causing the
3 image processor to perform the following operations:

4 correct the image data using information including the control data; and
5 calibrate the image data using information including the control data and at least one
6 characteristic of the designated printer.

1 65. The system of claim 64 wherein the image processor software further comprises
2 instructions for causing the image processor to generate a destination identifier image, wherein
3 the destination identifier image can be used to print a destination identifier print that identifies
4 the specified recipient for a corresponding sub-batch of image prints and is generated from at
5 least the sub-batch's control data.

1 66. The system of claim 65 wherein the destination identifier image for each sub-
2 batch is generated from the sub-batch's control data and image data.

1 67. The system of claim 64 wherein the image cache includes software in a computer-
2 readable medium comprising instructions for causing the image cache to perform the following
3 operation:

4 in response to a message from the scheduler indicating that the scheduler has sent control

5 data for a batch to the line controller, send the image data for that batch to the image processor
6 associated with that queue.

1 68. The system of claim 43 further comprising a backprinter for backprinting at least
2 one image print.

1 69. The system of claim 68 wherein the backprinter backprints non-image information
2 on each image print.

1 70. The system of claim 69 wherein the non-image information includes at least one
2 of an image number associated with the image, a printable unit number associated with the
3 printable unit from which the image print was printed, reorder information, a bar code, and a
4 message.

1 71. The system of claim 70 wherein the message is an advertisement.

1 72. The system of claim 71 wherein the bar code encodes at least one of an audio
2 message, the image number associated with the image, and the printable unit number associated
3 with the printable unit from which the image print was printed.

1 73. The system of claim 59 further comprising a digital camera for capturing data
2 about at least one of the image prints.

1 74. The system of claim 73 wherein the camera is a low-resolution camera.

1 75. The system of claim 73 wherein the captured data is used to verify that the an
2 image print was printed with the correct image data.

1 76. The system of claim 73 wherein the captured data is used to check the quality of
2 the image print.

1 77. The system of claim 43 further comprising an inverter that inverts each image
2 print prior to backprinting.

1 78. The system of claim 77 further comprising a curl reduction equipment that
2 reduces curling of the image print prior to backprinting.

1 79. The system of claim 78 wherein the curl-reduction equipment uses suction to
2 reduce curling of the image print.

1 80. The system of claim 79 wherein the curling-reduction equipment device includes
2 a vacuum table.

1 81. The system of claim 77 further comprising an alignment device that aligns each
2 image print prior to backprinting.

1 82. The system of claim 81 wherein the alignment device includes:
2 an alignment wall against which each image print is to be aligned prior to backprinting;
3 and
4 a skew conveyor that receives each image print after the image print has been printed and
5 moves the image print towards the alignment wall as the skew conveyor conveys the image print
6 to the backprinter.

1 83. The system of claim 82 further comprising an alignment sensor positioned

2 laterally inward from the alignment wall that detects whether a portion of the image print is
3 positioned immediately beneath the alignment sensor.

1 84. The system of claim 83 wherein the alignment sensor is a photosensor that
2 optically senses the presence of the image print.

1 85. The system of claim 43 further comprising a conveyor on which image prints are
2 stacked after printing.

1 86. The system of claim 85 further comprising a controller, connected to the
2 conveyor, that advances the conveyor so that a new stack can be stacked after all the image prints
3 in a printable unit have been stacked on the conveyor.

1 87. The system of claim 86 further comprising a plurality of bins, positioned on the
2 conveyor, so that the image prints for a printable unit are stacked in a bin.

1 88. The system of claim 87 wherein the bin comprises:
2 a base for supporting the bin when the bin is placed on a surface of the conveyor;
3 a first bottom wall connected to the base so that the first wall has a pitch incline with
4 respect to the surface of the conveyor; and
5 a second bottom wall connected to a first end of the first wall at one end, the second wall
6 and first wall forming an angle so that image prints received in the bin tend to stack on the first
7 bottom wall with an edge of each image print registering with the second bottom wall.

1 89. The system of claim 52 further comprising a storage device in which one or more
2 sub-batches can be stored for later combination with other sub-batches.

1 90. An alignment device used for aligning image prints, the alignment device
2 comprising:
3 an alignment wall against which each image print is to be aligned; and
4 a skew conveyor that receives each image print after the image print has been printed and
5 moves the image print towards the alignment wall as the image print is conveyed along the skew
6 conveyor.

1 91. The alignment device of claim 90 further comprising an alignment sensor
2 positioned laterally inward from the alignment wall that detects whether a portion of the image
3 print is positioned immediately beneath the alignment sensor.

1 92. The system of claim 91 wherein the alignment sensor is a photosensor that
2 optically senses the presence of the image print.

1 93. A bin for collecting image prints comprising:
2 a base for supporting the bin when the bin is placed on a surface;
3 a first bottom wall connected to the base so that the first wall has a pitch incline with
4 respect to the surface; and
5 a second bottom wall connected to a first end of the first wall at one end, the second wall
6 and first wall forming an angle so that image prints received in the bin tend to stack on the first
7 bottom wall with an edge of each image print registering with the second bottom wall.

1 94. The bin of claim 93 wherein the first bottom wall has an access notch formed
2 therein that provides access to any image prints stacked in the bin.

1 95. The bin of claim 93 further comprising a side wall mounted to a side edge of the
2 first and second bottoms walls.

1 96. The bin of claim 95 wherein the first bottom wall has a roll incline with respect to
2 the surface so that image prints received in the bin tend to stack on the first bottom wall with an
3 edge of each image print registering with the second bottom wall.

1 97. A method of tracking an order specifying a plurality of recipients and, for each
2 specified recipient, a sub-order of one or more images associated with that recipient, wherein
3 each image is to be printed, packaged, and shipped, the method comprising:

4 indicating that the image is in a first state when the order with which the image is
5 associated has been received from a user;

6 indicating that the image is in a second state when the image is being processed;

7 indicating that the image is in a third state when an image print created from the image
8 has been packaged; and

9 indicating that the image is in a fourth state when the image print has been shipped.

1 98. The method of claim 97 further comprising indicating that the image is in a fifth
2 state if the image is stored.

1 99. The method of claim 98, wherein the first state is an entered state, the second state
2 is a processing state, the third state is a packaged state, the fourth state is a shipped state, and the
3 fifth state is a stored state.

1 100. The method of claim 97, further comprising, if an error is detected while the
2 image is in the second state and before the image is in the third state, reprinting the image.

1 101. A method of checking an image print that was printed from an image stored in an
2 electronic file, the method comprising:

3 generating a first image signature based on the electronic file;
4 generating a second image signature based on the image print; and
5 signaling an error if a predetermined criterion that is a function of the first and second
6 signatures is met.

1 102. The method of claim 101 wherein generating the first image signature includes
2 sampling the electronic file to create a lower-resolution image based on the image.

1 103. The method of claim 102 wherein generating the second image signature includes
2 taking a picture of the printed image.

1 104. The method of claim 102 wherein the Haar feature-recognition algorithm is used
2 to determine if the predetermined criterion is met.

1 105. The method of claim 103 wherein the pictures are taken at substantially the same
2 resolution as the lower-resolution image.

1 106. The method of claim 105 wherein the lower-resolution image and the picture each
2 comprise a plurality of pixels.

1 107. The method of claim 106 further comprising signaling a second error if a
2 predetermined number of pixels in the lower-resolution image do not match corresponding pixels
3 in the picture.

1 108. The method of claim 101 wherein the predetermined criterion is that the first and
2 second signatures correlate within a predetermined tolerance.

1 109. The method of claim 101 wherein checking comprises confirming that the image
2 prints are printed in the correct order.

1 110. The method of claim 101 wherein checking comprises examining the quality of
2 the image prints.

1 111. A method of generating an image print from an image, the method comprising:
2 receiving an image;
3 printing the image to generate an image print;
4 reducing curling of the image print; and
5 backprinting information on the back of the image print.

1 112. The method of claim 111 wherein the image includes image data and control data.

1 113. The method of claim 111 wherein the image is printed on a printer.

1 114. The system of claim 113 further comprising, before printing the image:
2 correcting the image data for the image using information including the control data; and
3 calibrating the image data using information including the control data and at least one
4 characteristic of the printer.

1 115. The method of claim 111 wherein the information backprinted on to the image
2 includes non-image information.

1 116. The method of claim 115 wherein the non-image information includes at least one
2 of an image number associated with the image, reorder information, a bar code, and a message.

1 117. The method of claim 116 wherein the message is an advertisement.

1 118. The method of claim 117 wherein the bar code encodes at least one of an audio
2 message and an image number.

1 119. The method of claim 118 wherein the image number is associated with the image.

1 120. The method of claim 111 further comprising inverting the image print prior to
2 backprinting.

1 121. The method of claim 120 further comprising aligning the inverted image print
2 prior to backprinting.

1 122. The method of claim 111 wherein curling of the image print is reduced using
2 suction.

1 123. The method of claim 122 wherein curling of the image print is reduced using a
2 vacuum table.

1 124. The method of claim 121 further comprising verifying that an image print was
2 printed with the correct image.

1 125. The method of claim 111 further comprising checking the quality of the image
2 print.

1 126. A print system for printing images, the system comprising:
2 a front-end computer sub-system that receives an order specifying one or more images

3 and one or more recipients;

4 a printer sub-system, connected to the front-end computer sub-system, that prints image
5 prints from the images in the order;

6 a packaging sub-system that receives image prints from the printer sub-system and
7 packages the image prints for shipment to the order's recipient; and

8 a shipping sub-system that receives the packaged image prints from the packaging sub-
9 system and ships the packaged image prints to the order's recipient;

10 wherein the images are processed automatically by the front-end sub-system, the printer
11 sub-system, the packaging sub-system, and the shipping sub-system.

1 127. A method of distributing image prints comprising:

2 receiving set of one or more image prints, the set having one or more associated
3 recipients;

4 indicating which type of packaging material is to be used to package the set of image
5 prints based on information printed on at least one of the image prints in the set of image prints;

6 and

7 indicating which method of shipping is to be used to ship the set of image prints based on
8 information printed on at least one of the image prints in the set of image prints.

1 128. The method of claim 127 further comprising packaging the set of image prints
2 using the indicated type of packaging material.

1 129. The method of claim 127 further comprising shipping the set of image prints
2 using the indicated shipping method.

1 130. The method of claim 127 wherein indicating which type of packaging material is
2 to be used includes lighting a light associated with the indicated type of packaging material.

1 131. The method of claim 127 wherein indicating which shipping method is to be used
2 includes lighting a light associated with the indicated shipping method.

1 132. The method of claim 127 wherein the information printed on at least one image
2 print includes a bar code.

1 133. The method of claim 132 further comprising reading the bar code printed on at
2 least one image print.

1 134. The method of claim 133 wherein the type of packaging material to be used to
2 package the set of image prints is indicated based on the bar code.

1 135. The method of claim 133 wherein the method of shipping to be used is indicated
2 based on the bar code.

1 136. A packaging system comprising:
2 a plurality of packaging bins for storing image print packaging material;
3 a plurality of visual indicators, wherein each packaging bin is associated with at least one
4 visual indicator, wherein the visual indicators associated with the packaging bins are used to
5 indicate in which packaging bin the packaging material for a set of image prints is stored.

1 137. The system of claim 136 further comprising a plurality of shipping bins for
2 storing packaged image prints, wherein each shipping bin is associated with at least one visual
3 indicator and at least one shipping method; and wherein the visual indicators indicate in which
4 shipping bin a packaged set of image prints should be stored for subsequent shipping by the
5 shipping method associated with the indicated shipping bin.

1 138. The system of claim 137 wherein the visual indictors are used to sort the packaged
2 image prints by method of shipping.

1 139. The system of claim 137 wherein each shipping bin is associated with a range of
2 weights.

1 140. The system of claim 139 wherein the visual indictors are used to sort the packaged
2 image prints by weight and method of shipping.

1 141. The system of claim 137 wherein each shipping bin is associated with one or
2 more ZIP codes.

1 142. The system of claim 141 wherein the visual indictors are used to sort the packaged
2 image prints by ZIP code and method of shipping.

1 143. The system of claim 136 wherein the visual indicators comprise a plurality of
2 lights.

1 144. The system of claim 136 further comprising a display monitor, and wherein the
2 visual indictors are displayed on the display monitor.

1 145. The system of claim 136 further comprising a storage rack for storing image
2 prints for subsequent combination with other image prints.

1 146. The system of claim 145 wherein the storage rack further includes plurality of
2 cubby-holes, each cubby-hole having an associated visual indicator.

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